

Health Consultation

Pasco Sanitary Landfill Site: Review of the Phase II Remedial Investigation, Risk Assessment/Cleanup Level Analysis Document, and Feasibility Study Pasco, Franklin County, Washington

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**Prepared by
The Washington State Department of Health
Under a Cooperative Agreement with the
Agency for Toxic Substances and Disease Registry**



FOREWORD

The Washington State Department of Health (DOH) has prepared this Health Consultation in cooperation with the Agency for Toxic Substances and Disease Registry (ATSDR). ATSDR is part of the U.S. Department of Health and Human Services and is the principal federal public health agency responsible for health issues related to hazardous waste. This Health Consultation was prepared in accordance with methodologies and guidelines developed by ATSDR.

The purpose of this Health Consultation is to identify and prevent harmful human health effects resulting from exposure to hazardous substances in the environment. The Health Consultation allows DOH to respond quickly to a request from concerned residents for health information on hazardous substances. It provides advice on specific public health issues. DOH evaluates sampling data collected from a hazardous waste site, determines whether exposures have occurred or could occur, reports any potential harmful effects, and recommends actions to protect public health.

For additional information or questions regarding DOH, ATSDR, or the contents of this Health Consultation, please call the Health Advisor who prepared this document:

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BACKGROUND AND STATEMENT OF ISSUES

The Washington State Department of Ecology (DOE) has asked the Washington State Department of Health (DOH) to review and provide feedback on the Pasco Sanitary Landfill Phase II Remedial Investigation (RI), Cleanup Level Analysis Documents, and Feasibility Study (FS). This health consultation presents comments on these documents. Particular attention is given to those aspects of the documents that address the protection of human health.

Site Background

The Pasco Sanitary Landfill is a 200 acre site located approximately 1.5 miles northeast of the city of Pasco in Franklin County, Washington. The site and its surrounding areas are zoned for agricultural and commercial use.¹ Originally operated as an open burning facility in 1958 through 1971, in 1972-1974 the site was used for industrial waste disposal. Bulk sludges and drummed wastes were the primary wastes accepted at the facility and they were segregated into five zones of the site designated as Zones A-E. During the period of industrial waste disposal, the site operated as a Municipal Landfill and accepted various bulk liquids, septic tank wastes, sewage sludges, and animal fat emulsions. Due to community concerns regarding the acceptance of herbicide waste, the acceptance of industrial waste was terminated in December of 1974. Closure of the industrial part of the site began in 1975 and was completed in 1980.²

In 1984 the site was investigated as part of the U.S. Environmental Protection Agency's (EPA) nationwide dioxin investigation.³ At this time, no dioxin contamination or organic contaminants were detected in groundwater at the site. Further investigations in 1985 detected volatile organic compounds (VOCs) in groundwater beneath the site.³ The Pasco Landfill was added to the National Priority List (NPL) in 1990. Phase I of the remedial investigation (RI) was completed in 1994. Phase II RI activities began in 1995. In the summer of 1995, VOC contamination was found in off-site groundwater and an expanded off-site investigation was commenced to investigate and identify potentially impacted residential wells.

Beginning in 1996, Interim Remedial Measures (IRMs) were implemented at the site.³ These measures included: providing bottled water to potentially impacted users of off-site groundwater, extending the public water supply to those users whose wells were impacted, installation of a Soil Vapor Extraction (SVE) system to treat the source areas and limit migration of contaminants, and installation a NoVOCsTM groundwater treatment system at the site to remove VOCs from groundwater and limit subsequent contaminant migration.

DISCUSSION

The FS for the Pasco Landfill Site is based upon findings of the Phase I and II RI's and the Risk Assessment/Cleanup Levels Analysis. The IRMs, implemented in 1996, have been very successful at significantly reducing the impact of wastes on the surrounding communities.² The technologies

implemented, including the SVE and NoVOCs™ treatment systems, have efficiently worked to reduce and remove VOC's (volatile organic compounds) from both the groundwater and soils. The remedial actions chosen in the FS are based on the success of these IRMs. To thoroughly review the FS, the Phase II RI and Risk Assessment/Cleanup Actions level analysis were also reviewed.

CONCLUSIONS

Significant modifications in the reviewed Pasco Landfill Site FS are required to adequately address human health concerns both on and off-site. DOH is very concerned about the potential risks for future exposures from contaminated groundwater as the plume migrates and/or incidental releases during remediation. The remediation options, as presented, call for leaving over 40,000 drums of waste on-site. Although the removal of these drums presents a significant ecological and human health risk, and may also be technically infeasible, leaving the drums in place also presents a similar and substantial future threat to human health. This future risk can be mitigated through the implementation of engineering technologies that will intercept a potential contamination plume. ***These technologies have not been adequately considered or addressed.*** The major methodologies that have been suggested for cleanup have previously been shown, through their implementation as IRMs, to be effective at this site for the removal of VOCs. Other non-VOC contaminants, including pesticides, herbicides and metals are not being removed by this methodology and their presence creates the potential for significant future human health risks. Capping alone does not adequately prevent the potential for future releases from drums remaining. Considering the poor condition of the drums, disintegration and future releases to groundwater are a real threat. There are some specific concerns that DOH would like to see addressed. These concerns pertain to containment, future sampling, and monitoring plans. Comments and recommendations for addressing these concerns are given in the following section.

RECOMMENDATIONS

This section will address specific comments and recommendations for changes to the Phase II RI, Risk Assessment/Cleanup Analysis, and FS.

Phase II RI

1. In general, a very thorough remedial investigation was conducted. Significant soil and groundwater data were collected. The extent of contamination has been very well delineated within each area and zone of the Pasco Landfill Property. The predominant areas of concern, Zone A and the municipal landfill, have been extremely well characterized. Additionally, the migration of contaminants to off-site ground water has also been well characterized.
2. A major concern with the RI, associated quarterly monitoring data, and more recent monitoring data, is that the reporting limits for many volatile organic compounds (VOCs) are above the compounds respective health based screening values. It is therefore very difficult to determine

if the health based guidelines and the Model Toxics Control Act (MTCA) B levels are exceeded. Table 1, in the Appendix, shows some of these contaminants, their reporting limits and their MTCA B levels. Some of these compounds were detected at the landfill and in off-site monitoring wells during sampling for the RI. Additionally, perchloroethylene and vinyl chloride are indicator hazardous chemicals at this site. The analytical methods that are used for continued monitoring must be able to achieve reporting limits that are at or below the MTCA B values. If the reporting limits are too high, we cannot adequately determine if human health is being protected. The significance of compounds “not detected above the specified reporting limit” is slight when the reporting limits are above health based screening values. ***Analytical methods must be modified to achieve lower reporting limits.*** The analytical methods must be sensitive enough to be useful as valid comparisons to health based guidelines.

3. Acrylonitrile was detected in groundwater at the Pasco Landfill Site, but quarterly reports for 1998 have not shown any monitoring data for this compound. In 1997, sampling protocols measured acrylonitrile in monitoring wells, but the reporting limits (4 µg/L) were above the MTCA B standard of 0.08 µg/L. Therefore, it is not known if the acrylonitrile levels in 1997 were below health based screening values. Please explain why monitoring protocols no longer include analysis for acrylonitrile.
4. The Third Quarter 1998 Groundwater Monitoring Report and IRM Performance Monitoring Report, shows that the reporting limit for carbon tetrachloride was 1 µg/L.⁴ The 1998 Annual Groundwater Monitoring Report and Fourth Quarter IRM Performance Monitoring Report shows the reporting limit for carbon tetrachloride as being 0.02 µg/L throughout 1998.⁵ Please explain this discrepancy. As the MTCA B level for carbon tetrachloride is 0.3 µg/L, the reporting limit for carbon tetrachloride should be kept below this level. Analytical procedures should be adjusted to consistently obtain the lower reporting limit.
5. Semi volatile organic compounds (SVOCs) monitored at the Pasco landfill site appear to be at levels below reporting limits. For hexachloroethane, the reporting limit (10 µg/L) is above the MTCA B standard of 6.25 µg/L. It is therefore impossible to determine if the MTCA B level has been exceeded. To protect human health, the reporting limit for this compound should be lowered. ***Please check the analytical protocols for all SVOCs to confirm that the reporting limits are below the MTCA B levels.***
6. It is unclear as to why pesticide monitoring of soil has not been conducted in phase II of the RI. Pesticides were detected in Phase I sampling and DDT (30.3 µg/kg) was found at levels that exceeded the MTCA B standard of 25.7 µg/kg. There is a large amount of uncharacterized waste at this site including, but certainly not limited to weed killers, herbicides, and 2,4-D. To be protective of human health, soil and groundwater monitoring should continually include analysis for pesticides. Although pesticides may not be presently impacting groundwater or soil, due to the presence of thousands of buried drums, there is a strong potential for future impacts. ***Without monitoring for all potential future contaminants, it is impossible to ensure that the site is not impacting public health, or will not impact public health in the future.***

7. According to the 1998 Annual Groundwater Monitoring Reports, the reporting limit for 2-methyl-4-chlorophenoxy-acetic acid (MCPA) was 50 µg/L for 3 sampling periods in 1998. The MTCA B value for MCPA in groundwater is 8.0 µg/L. Analytical protocols must be adjusted so that detection limits are equal to or below MTCA B values. There are almost 3000 drums in Zone B containing MCPA bleed; it is important to be able to detect low level leakages. Elevated reporting limits decrease the number of detects and make the media appear to be contaminant free, but in reality they are much less protective of human health. ***The current protocols are unacceptable for health-based determinations.***
8. It is important to continually monitor for metals in groundwater and soil due to the large volume of waste (over 40,000 drums) at the Pasco Landfill Site. It is hard to predict when and if these drums might begin to impact the site at a greater level. Without monitoring, we cannot ensure that human health is protected. For certain metals, including antimony, manganese, chromium, and thallium, the MTCA levels are significantly higher than the ATSDR health based screening values. To be truly protective of human health, detection protocols should be sensitive enough to detect metals at levels as low as at the lower health based values. DOH can work with DOE and liable parties to adjust these values to appropriate levels for the protection of human health.
9. According to the 1998 Quarterly monitoring reports, the reporting limit for beryllium was 1 µg/L. The MTCA B value for this metal in groundwater is 0.02µg/L. Although beryllium has not frequently been detected, this may be due to the high reporting limit. Analytical protocols must be adjusted so that detection limits are equal to or below MTCA B values. Elevated reporting limits decrease the number of detects and make the media appear to be contaminant free, but in reality they are much less protective of human health. ***The current protocols are unacceptable for health based determinations.***
10. The detection of a number of metals was determined not to be site related and was attributed to background levels. Regardless of the source or reason for their presence, metals exceeding health-based values should still be considered a risk and a complete risk analysis should be conducted. The risk will not change regardless of the source and if the contamination is present on-site, or off-site, at levels which adversely impact human health, remediation may be necessary.
11. As reporting limits for so many contaminants, including VOCs, sVOCs, metals, and herbicides have been above health based standards, it is highly recommended that the analytical protocols for all potential contaminants are reevaluated to ensure that protocols are sensitive enough to detect levels at least equal to MTCA B values. Although they have not been examined by DOH, the QAPP's should ensure that these levels are obtained. ***If these analytical goals are not being met, a complete reevaluation of laboratory standards and methodologies should be considered.***

Risk Assessment/Cleanup Analysis

12. In general, the screening process used to select the indicator hazardous substances appears to be consistent with MTCA guidelines. Similarly, calculations for cleanup levels of indicator hazardous substances have been done in accordance with the MTCA protocols and should adequately protect human health. In general, values used in Tables 4-6 are appropriate, with one noted exception.

The value used for 1,2-dichloroethane (1,2-DCA), 0.083 mg/L, is not the most protective value. The levels of 1,2-DCA have increased, and in December of 1998, the levels in well EE-3 reached 0.27 mg/L. This increased level changes the Hazard Quotient value and cancer risk number. Although these changes do not significantly change clean up standards, the cancer risks and HQ values should be reassessed using the highest site concentration for each compound. ***As new quarterly monitoring data have become available since the risk analysis was conducted, DOH recommends reevaluation of the concentrations used for preliminary indicator substances before cleanup commences.*** It is possible that changes in monitoring data may effect subsequent health based risk analysis and cleanup levels. There is also concern as to why the 1,2-DCA levels in well EE-3 are increasing. Please comment on this.

13. In the discussion of the selection of preliminary indicator hazardous substances for soil (section 2.4.2), chemicals which exceeded tertiary screening levels were not selected as indicator hazardous substances in soil (for groundwater protection) if the chemical was not considered to be a final indicator hazardous substance in groundwater. DOH questions the validity of this reasoning, especially since no justification is provided. It is possible that high levels of a compound in soil could at some point in the future impact the groundwater above a level which presently exists. Discounting a chemical in soil because the chemical is not currently a groundwater concern does not appear to be protective of human health. This is of particular concern when trying to predict and protect health in the future. ***Please comment on the reasoning that is used and further explain how this logic will adequately protect human health.***
14. MTCA method C may not be appropriate for industrial cleanup of soils (and protection of groundwater), at this site. All adjacent properties are not zoned industrial, nor are they all used for industrial purposes. Although the landfill has a conditional use permit, the site itself is not zoned for industrial use and the surrounding areas are zoned for agriculture or light industrial use. Immediately west and southwest of the site are potato and alfalfa fields, as well as a feedlot for cattle. Onions are stored nearby. There are also residences to the south/southwest and hunting also occurs in close proximity to the site. As this site has already impacted groundwater (generally south and southwest of the landfill), a reasonable maximum exposure scenario should be more protective than an industrial standard. Until there is reasonable certainty that the site will not be impacting off-site areas, the zoning and land use of the off-site areas needs to be considered. Recent local issues have included discussion of building a school that would sit above the contaminated groundwater plume that is originating from the landfill site. Although the site is expected to remain a solid waste disposal facility, the uses of the adjacent land should be considered. A school would not be considered an industrial use, and cleanup standards need to take this type of potential future land use into account. ***Please consider reexamination of***

cleanup levels using MTCA method B and please comment further on the decision to go with the industrial standard. A reevaluation may be necessary.

15. Is the landfill presently fenced completely around its perimeter? If not there should be plans to do this type of fencing and fencing should be included as part of the institutional controls that will be applied. Since there is hunting in the region, as well as residential housing, it is important that access to the facility, *from all sides*, is limited.
16. Although the Department of Ecology (DOE) requires that a closure plan includes a landfill gas control system, is there a specific area of the RI, Risk Analysis, or FS that addresses this gas control system? Since the FS discusses capping many areas of the landfill, DOH assumes there will be a gas control system and a long-term air monitoring plan. Please make these plans available for comment.

Feasibility Study

17. In the executive summary, under discussion of access and institutional controls, it is stated that continuous monitoring of groundwater and remediation systems will occur during implementation and for five years after (FS, executive summary page 4). DOH is concerned by the potential threat to groundwater from the 5000 drums of pesticide waste in Zone B. Although these drums have been stable for over 20 years and have not yet impacted groundwater, if and when they do, the health and ecological implications of a pesticide and herbicide contaminated groundwater plume could be catastrophic. A limited investigation, in 1998, showed that the drums are in poor condition and contain a ‘somewhat oily’ waste (FS, page 5-3). Even if the drums are still intact 5 years from now, there is no guarantee that in 10 years they will still be in the same condition. Eventually the drums will disintegrate and release their contaminants. As mentioned in section 6.6.2, the risk of leaving the drums in place is far less than removing the drums, but this does not negate the potential for future uncontrolled releases from the underground drums. *Since the suggested remedial alternative for Zone B leaves these drums in the ground, groundwater monitoring should be continued for an indefinite period.* There could be an impact on groundwater 15 years from now and unless monitoring is continued, this impact could be overwhelming if a leak is not detected early.

In section 5.3.1 of the FS, under groundwater monitoring, it states that ‘for those alternatives that rely on containment, groundwater monitoring would continue indefinitely.’ It is assumed that for Zone B containment is the goal, but the specific length of time that groundwater monitoring will continue is unclear. *Please clarify the duration for which groundwater will be monitored for all areas of the Pasco Landfill, as well as in off-site areas. In all areas of the landfill, unless removal is the remediation option chosen, groundwater monitoring should continue indefinitely, even if there are no current impacts on groundwater from the particular area.*

18. In section 5.2.4 of the FS, when determining the depth of waste in Zone E, borings that went to 9 feet did not reach the lower boundary of the waste. The depth of the waste was therefore

assumed to be 10 ft. Please explain why 10 feet and not some other value was chosen? This assumed depth affects not only estimates of the total volume of waste in Zone E, but also the potential for the waste to come in direct contact with the shallow groundwater zone.

19. In section 5.3.3.2 of the FS, under zone inspections (FS, page 5-16), it is stated that '*cover system inspections will be performed by qualified personnel on a routine basis or following a storm event.*' Please explain what is meant by routine? ***Routine should imply at least quarterly inspections, as opposed to yearly, or bi-yearly inspections.*** Please clarify this statement.
20. In section 6.5.2 of the FS, on page 6-6 when discussing cleanup alternatives, it is stated that '*long-term monitoring is included for as long as hazardous substances exceed cleanup standards.*' ***Please clarify what is meant by long-term monitoring and what these parameters would be.*** The fact that cleanup standards are achieved, does not prevent against future releases from waste left in place. Since containment, and leaving waste in specific zones of the landfill is a chosen remedial action, please describe how future monitoring will continue to ensure that potential future releases from leaking drums will be detected. Future monitoring should be at regular intervals for an indefinite time period. Due to the presence of so many poorly characterized drums, monitoring for SVOCs, metals, pesticides, and herbicides, as well as VOCs, should be continued indefinitely.
21. DOH is concerned that a leak or spill from one drum or multiple drums in Zone A will overwhelm the SVE and NoVOCsTM treatment systems. The design capacity of the treatment systems must be able to accommodate the potential contribution from a large quantity of drums. Are there other remediation plans that would protect against such a spill or leakage? ***Considering the known poor condition of the stored drums, there should be some back-up plans to support the treatment systems if the drums are left in place.*** Please comment on these plans.
22. Similar to concerns mentioned above, DOH is worried that quarterly groundwater monitoring is not sufficient to protect human health. As the groundwater, and the plume, are moving at approximately 15 feet per day (ft/day), quarterly monitoring programs allow the detection of present contamination levels. If there are additional releases from the drums, other than VOCs (which are monitored in landfill gas monthly), significant contamination to groundwater could occur within the three month period between monitoring events. ***Future monitoring should not only be indefinite, but due to the tremendous amount of drums being left on-site, to truly protect human health, monitoring should occur more frequently than quarterly.*** Please address this concern.
23. There is concern that capping the waste and leaving it in place is not a sufficient remedy to prevent the discharge of contaminants to groundwater over time. The current SVE and NoVOCsTM treatment systems are working for VOCs, but VOCs do not account for all the waste present on the landfill property. ***If the waste is going to remain on-site, additional source controls that would prevent future exposure should be considered.*** These controls should include technologies such as a collection gallery, curtain, or environmental dam. In table

4-2 on comments for waste/soil remediation, for containment it appears as though, excluding covering/capping, only a few options were considered (revegetation, grading, grout injection, and diversion/collection of surface water). DOH does not have expertise in the specific technologies, but DOE and environmental engineering experts should be able to provide information on other feasible technologies. DOH would like to see more options considered. For instance, option B-3 which includes the construction of vertical and horizontal subsurface barriers, would minimize potential future exposures. DOH strongly recommends that options such as this be considered to protect human health. With so much uncharacterized waste at the Pasco Landfill site, it is necessary to consider potential future risks. Anything that would intercept a potential moving plume should be considered more thoroughly.

24. Given the potential future risks of leaving over 40,000 drums in place, a deed restriction, or zoning covenant should be considered for the areas south/southwest of the landfill site. This region should cover areas that are currently impacted by the moving groundwater plume or lie in the path of the moving plume. ***Unless the plume is contained, possibly with technologies mentioned above, to protect human health, zoning should be adjusted so that future human exposures will be prevented.*** Ideally, the plume should be contained, but if this is not an option, zoning restrictions should be considered. Please comment on the possibility of containing the current plume and the possibility of zoning modifications.
25. As additional information regarding this site becomes available, DOH would like the opportunity to conduct further evaluations. DOH would also like the opportunity to comment on future remedial work plans.

REFERENCES

1. Risk Assessment/Cleanup Level Analysis, Pasco Landfill, Pasco Washington. Prepared by Philip Environmental Services Corp. Sept. 1998.
2. Feasibility Study Report Pasco Landfill, Pasco, Washington, Final Draft. Prepared by Philip Environmental Services Corp. Apr. 1999.
3. Phase II Remedial Investigation Report Pasco Landfill, Pasco, Washington. Volume I and II. Prepared by Philip Environmental Services Corp. March 1998.
4. Third Quarter 1998 Groundwater Monitoring Report and Fourth Quarter 1998 IRM Performance Monitoring Report, Pasco Landfill Site, Pasco Washington, Prepared by Philip Environmental Services Corp. December 1998.
5. 1998 Annual Groundwater Monitoring Report and Fourth Quarter 1998 IRM Performance Monitoring Report, Pasco Landfill Site, Pasco Washington, Prepared by Philip Environmental Services Corp. March 1999.

APPENDIX

Table 1. Groundwater Contaminants with Reporting Limits Above Health Based Screening Values.

Contaminant	Sampling Date	Reporting Limit (µg/L)	MTCA B Value (µg/L)
Bromodichloromethane	3/98	<0.5	0.76
	6/98	<1	
	10/98	<1	
	12/98	<1	
Dibromochloromethane	3/98	<0.4	0.521
	6/98	<1	
	10/98	<1	
	12/98	<1	
1,2-Dibromo-3-chloropropane	3/98	<0.05	0.03
	6/98	<5	
	10/98	<5	
	12/98	<5	
1,2-Dibromoethane	3/98	<0.8	0.0005
	6/98	<1	
	10/98	<1	
	12/98	<1	
1,2-Dichloroethane	3/98	<0.5	0.481
	6/98	<1	
	10/98	<1	
	12/98	<1	
1,2-Dichloropropane	3/98	<0.5	0.643
	6/98	<1	
	10/98	<1	
	12/98	<1	
1,2-Dichloropropene	3/98	<0.5	0.243
	6/98	<1	
	10/98	<1	
	12/98	<1	

Contaminant	Sampling Date	Reporting Limit (mg/L)	MTCA B Value (mg/L)
Hexachlorobutadiene	3/98		0.561
	6/98	<1	
	10/98	<1	
	12/98	<1	
Perchloroethylene (PCE)	3/98	0.5	0.858
	6/98	<1	
	10/98	<1	
	12/98	<1	
1,1,2-Trichloroethane	3/98	0.5	0.76
	6/98	<1	
	10/98	<1	
	12/98	<1	
1,2,3-Trichloropropane	3/98	<0.7	0.006
	6/98	<1	
	10/98	<1	
	12/98	<1	
Vinyl Chloride	3/98	<0.02	0.023
	6/98	<0.02	
	10/98	<0.05	
	12/98	<0.05	

Glossary

Agency for Toxic Substances and Disease Registry (ATSDR)	The principal federal public health agency involved with hazardous waste issues, responsible for preventing or reducing the harmful effects of exposure to hazardous substances on human health and quality of life. ATSDR is part of the U.S. Department of Health and Human Services.
Contaminant	Any chemical that exists in the environment or living organisms that is not normally found there.
Cancer Risk Evaluation Guide (CREG)	The concentration of a chemical in air, soil or water that is expected to cause no more than one excess cancer in a million persons exposed over a lifetime. The CREG is a <i>comparison value</i> used to select contaminants of potential health concern and is based on the <i>cancer slope factor</i> (CSF).
Dose	A dose is the amount of a substance that gets into the body through ingestion, skin absorption or inhalation. It is calculated per kilogram of body weight per day.
U.S. Environmental Protection Agency (EPA)	Established in 1970 to bring together parts of various government agencies involved with the control of pollution.
Exposure	Contact with a chemical by swallowing, by breathing, or by direct contact (such as through the skin or eyes). Exposure may be short term (acute) or long term (chronic).
Groundwater	Water found underground that fills pores between materials such as sand, soil, or gravel. In aquifers, groundwater often occurs in quantities where it can be used for drinking water, irrigation, and other purposes.
Hazardous substance	Any material that poses a threat to public health and/or the environment. Typical hazardous substances are materials that are toxic, corrosive, ignitable, explosive, or chemically reactive.
Media	Soil, water, air, plants, animals, or any other part of the environment that can contain contaminants.
Monitoring wells	Special wells drilled at locations on or off a hazardous waste site so water can be sampled at selected depths and studied to determine the movement of groundwater and the amount, distribution, and type of contaminant.
Model Toxics Control Act (MTCA)	The hazardous waste cleanup law for Washington State.
Organic	Compounds composed of carbon, including materials such as solvents, oils, and pesticides which are not easily dissolved in water.
Plume	An area of contaminants in a specific media such as groundwater.
Remedial investigation	A study designed to collect the data necessary to determine the nature and extent of contamination at a site.
Risk	The probability that something will cause injury, linked with the potential severity of that injury. Risk is usually indicated by how many extra cancers may appear in a group of people who are exposed to a particular substance at a given concentration, in a particular pathway, and for a specified period of time. For example, a 1%, or 1 in 100 risk indicates that for 100 people who may be exposed, 1 person may experience cancer as a result of the exposure.
Volatile organic compound (VOC)	An organic (carbon-containing) compound that evaporates (volatilizes) easily at room temperature. A significant number of the VOCs are commonly used as solvents.

CERTIFICATION

The Pasco Sanitary Landfill Site Consultation was prepared by the Washington State Department of Health under a cooperative agreement with the Agency for Toxic Substances and Disease Registry. It is in accordance with approved methodology and procedures existing at the time the health consultation was begun.

Technical Project Officer, SPS, SSAB, DHAC

The Division of Health Assessment and Consultation, ATSDR, has reviewed this health consultation, and concurs with its findings.

Section Chief, SPS, SSAB, DHAC, ATSDR